

Zeuxine reflexa (Orchidaceae) - a report on its occurrence and conservation status in India^a

Anant Kumar¹, Avishek Bhattacharjee^{2,*}, P. Venu³ & Y.V. Rao⁴

Mots-clés/Keywords : Buxa Sanctuary, Goodyerinae, IUCN, West Bengal.

Abstract

Zeuxine reflexa, a less known terrestrial orchid belonging to the subtribe Goodyerinae, has been collected from Buxa Wildlife Sanctuary, Jalpaiguri, West Bengal, India. The status of the species in India is assessed as Critically Endangered [CR B2ab (ii, iv)] according to IUCN Red List Categories and Criteria. Its detailed description supported by an illustration and pertinent photographs is presented and its affinity with *Z. affinis* is discussed.

Résumé

Zeuxine reflexa (Orchidaceae). Notes sur sa présence en Inde et sur son statut de conservation – *Zeuxine reflexa*, une orchidée terrestre peu connue de la sous-tribu Goodyerinae, a été collecté dans le « Buxa Wildlife Sanctuary », Jalpaiguri, West Bengal, Inde. Le statut de l'espèce en Inde est estimé comme « en danger critique » [CR B2ab (ii, iv)] en conformité avec les catégories et les critères de la Liste rouge UICN. On propose une description détaillée accompagnée d'illustrations et une discussion de son affinité avec *Zeuxine affinis*.

Introduction

The genus *Zeuxine* Lindley is represented by ca. 80 species (Xinqi *et al.*, 2009). Its distribution extends from Tropical Africa to Central Asia and West Pacific

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(Govaerts *et al.*, 2013). Bhattacharjee (2010) listed 17 species of *Zeuxine* from India and in the same year Bhattacharjee & Sabapathy (2010) added a new species of the genus to the Indian orchid flora. While exploring the Buxa Wildlife Sanctuary, one of the authors (AK) discovered a single population of a *Zeuxine* sp. with 12 mature individuals which has been identified as *Zeuxine reflexa* King & Pantling. Its original description by King & Pantling (1898) was based on a collection (in April, 1895) from Mungpoo, Darjeeling district, West Bengal. The species is closely allied to *Zeuxine affinis* (Lindley) Bentham ex Hooker f. but differs from it essentially in having much thicker appendages of hypochile, slightly longer and reflexed epichile-lobules, and distinct, oblong columnar processes which are not prominent in *Zeuxine affinis*.

A detailed description as well as a dissection-plate (Fig. 1) and relevant photographs (Fig. 2) are provided to facilitate identification. The threat status of the species in India is also assessed according to IUCN's guidelines (IUCN, 2012).

Results

Zeuxine reflexa G. King & R. Pantling

in *Annals of the Royal Botanic Garden, Calcutta* 8: 291, t. 388 (1898); P. Bruhl, *A guide to the orchids of Sikkim*: 170 (1926); U.C. Pradhan, *Indian orchids: Guide to identification & culture* 1: 116 (1976); Bose *et al.*, *Orchids of India*: 470. 1999; N. Pearce & P.J. Cribb, *Orchids of Bhutan*: 114 (2002); S.Z. Lucksom, *Orchids of Sikkim and North East Himalaya*: 119, t. 79 (2007); S. Misra, *Orchids of India*: 320 (2007); Bhattacharjee *et al.* in *Taiwania* 56: 153 (2011). Types: Mungphoo, 3500 ft, April 1895, Pantling 361 [lectotype, CAL! (Barcode CAL0000000604), designated by Bhattacharjee *et al.* (2011); isolectotypes: CAL!; BM, photo!; K, photo!]. *Zeuxine grandis sensu* R. Das & K. Gogoi in *MIOS Journal* 14: 9 (2013), *non* Seidenfaden (1978: 90).

Terrestrial herbs, 17-23 cm tall. Rhizome up to 6 cm long, 3-6 mm thick, terete, creeping, rooting at nodes. Roots 1-5 cm long, pale brown, fleshy, with minute root-hairs. Stem unbranched, erect, sometimes decumbent at base, 5-8 cm long, 3-6 mm in diameter, pale green, glabrous, with membranous sheaths formed by withered leaf-bases. Leaves 3-5, scattered along stem, sometimes crowded near apex, 1.2-3 cm long, withered during flowering, glabrous; petioles 1-3 mm long, sheathing at base; lamina 1-2.8 × 0.4-0.8 cm, narrowly ovate to lanceolate, obtuse at base, acute at apex,

5 to many veined. Inflorescence a terminal raceme, laxly 6-12 flowered, pubescent; peduncles 6-8 cm long, with 1-2 bracts; bracts 0.8-1.3 cm long, acuminate at apex, clasping, pubescent; rachis 5-7 cm long. Floral bracts 4-9 × 1.5-2 mm, usually as long as ovary, ovate-lanceolate, acuminate at apex, 1-veined. Flowers 0.6-1.2 cm long, resupinate. Sepals free, greenish brown, pubescent; dorsal sepal 4.2-5.2 × 1.8-2.2 mm, ovate-lanceolate, subacute at apex, adnate to petals to form a hood on column, 1-veined; lateral sepals 4-5 × 1.5-2 mm, ovate-lanceolate to oblong-ovate, obtuse at apex, spreading, 1-veined. Petals 3.8-4.2 × 0.8-1.2 mm (at widest portion), obliquely elliptic-lanceolate, obtuse at apex, white, glabrous, 1-veined. Labellum 'Y' shaped, 3.5-5.5 mm long; hypochile saccate, creamy white with yellowish tinge and with 1 oblong-conical appendage on either side; mesochile 1-1.5 × 0.8-1 mm, oblong, creamy white, sometimes with yellowish tinge, margins incurved; epichile 2-lobed, lobules oblong, 2.8-3.5 × 1.8-2.2 mm, creamy white to pale yellowish-white, reflexed (acquired specific epithet – 'reflexa', based on the reflexed epichile-lobules), diverging, forming an acute angle to the axis of the labellum, with a minute apiculus at apex of sinus. Column c. 2 mm long, with 2 obliquely oblong wings just below the rostellum. Rostellum c. 1 mm long, bifid, projecting, subacute to obtuse at apex. Stigma 2-lobed, elliptic, well separated, lateral. Anther c. 2.6 × 1.8 mm. Pollinarium c. 2 mm long; pollinia 2, c. 1.2 mm long, obovate to obclavate, sectile, bifid; caudicles c. 0.3 mm long; tegula c. 0.7 mm long, linear-spathulate, semi-transparent; viscidium c. 0.5 × 0.3 mm, oblong-elliptic, covering the tegula. Ovary sessile, 4-9 × 2-4 mm, terete to elliptic-fusiform, green, pubescent.

Flowering & Fruiting: February–May.

Habitat: The species is found growing in leaf-litter, in the shaded areas of forests at elevations from 75 to 1400 m. Although habit and habitat of *Zeuxine reflexa* are very similar to that of some other *Zeuxine* species, viz. *Z. affinis*, *Z. flava* (N. Wallich ex Lindlley) Trimen, *Z. clandestina* Blume, *Z. gracilis* (Breda) Blume etc., *Z. reflexa* is known by relatively more limited collections in India than its related species. Its assessment in national perspective is presented below.

Distribution: INDIA: Assam (fide R. Das & K. Gogoi, *l.c.* as '*Z. grandis*' - see above), Sikkim (fide S.Z. Lucksom, *l.c.*), West Bengal; BHUTAN; CHINA; TAIWAN; THAILAND.

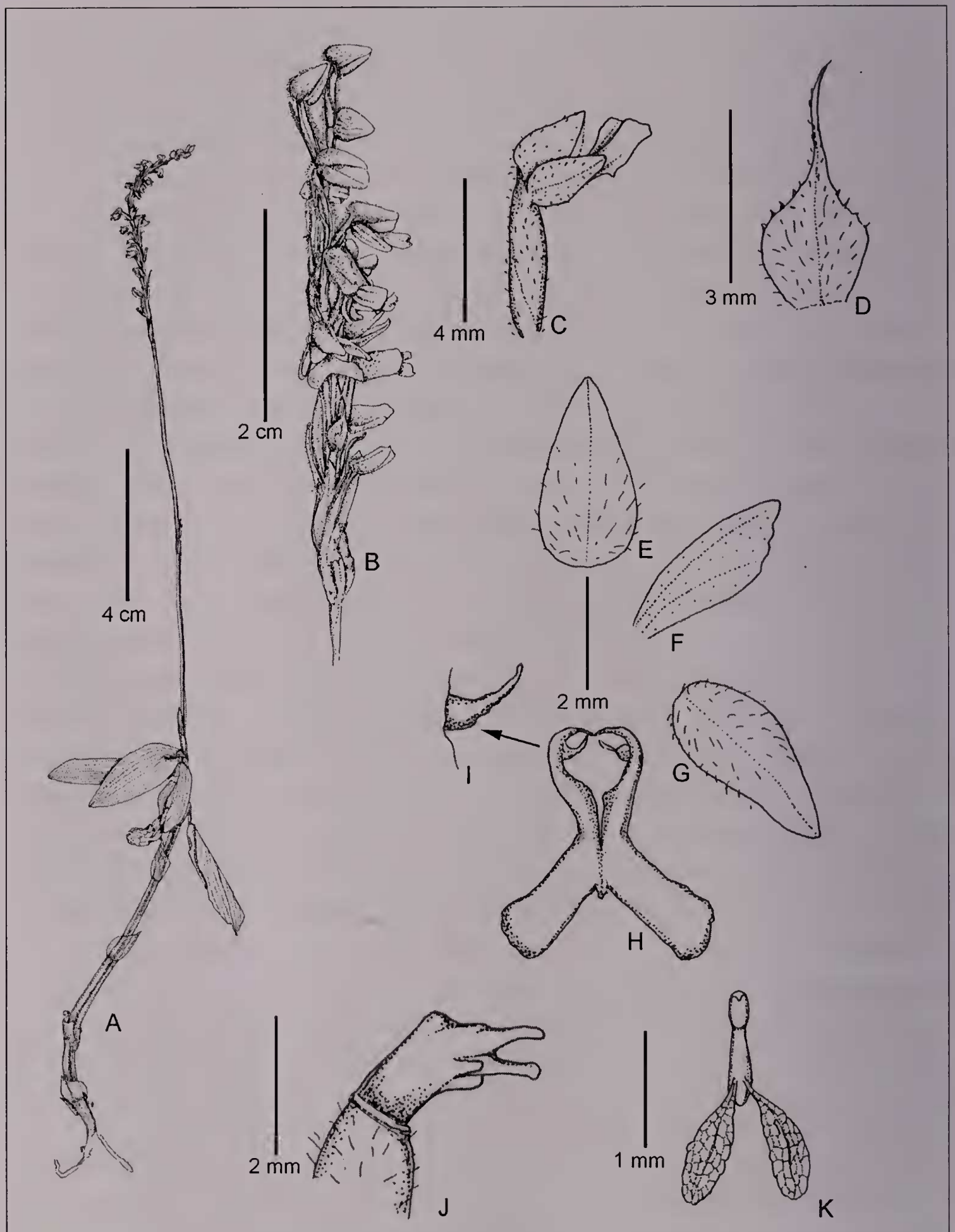


Fig. 1 : *Zeuxine reflexa* King & Pantling

A. Habit; B. Rachis; C. Flower; D. Bract; E. Dorsal sepal; F. Petal; G. Lateral sepal; H. Labellum; I. Close-up of appendage inside hypochile; J. Column with a portion of ovary; K. Pollinarium

[A: Anant Kumar 58801 A (CAL); B-K: Anant Kumar 58801 B (CAL)]

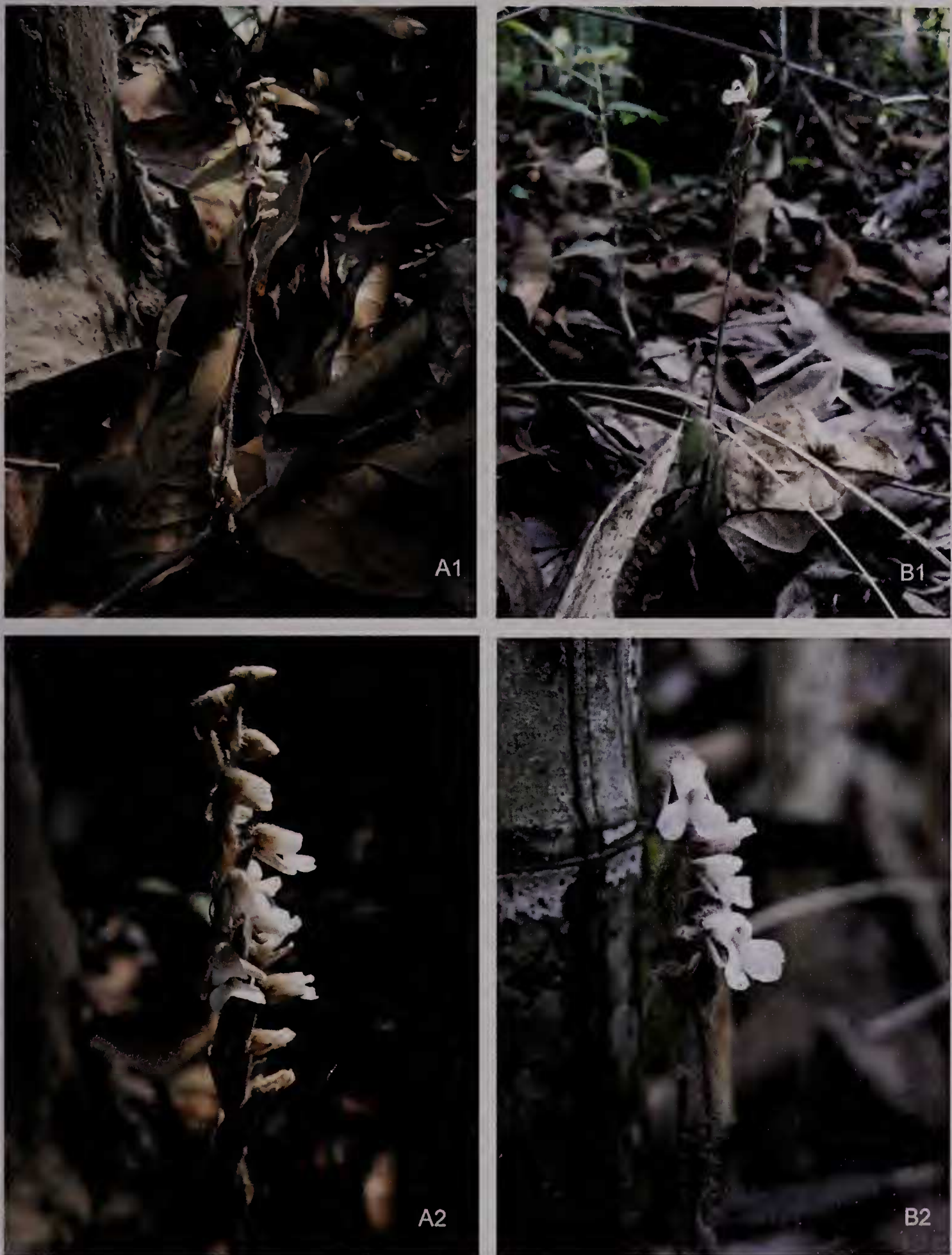


Fig. 2. A1-A2: *Zeuxine reflexa* King & Pantling: B1-B2: *Z. affinis* (Lindley) Bentham ex Hooker f.

[Photo: A1-A2: Anant Kumar; B1-B2: Avishek Bhattacharjee]

Conservation Status: *Z. reflexa*, apart from India, is known from Bhutan (N. Pearce & P.J. Cribb, *l.c.*), China (Xinqi *et al.*, 2009), Taiwan (Xinqi *et al.*, 2009) and Thailand (Xinqi *et al.*, 2009) but its conservation status in these floras was not discussed. As far as India is concerned, its occurrence has been reported four times: (1) from Mungpoo (type locality), West Bengal by G. King & R. Pantling (*l.c.*), (2) from Sakyong and Linchom of West Sikkim by S.Z. Lucksom (*l.c.*, specimens not cited but treated as 'Rare'), (3) from Chirang and Bhumeswar Reserve Forests of Assam by R. Das & K. Gogoi (*l.c.*) as '*Zeuxine grandis* Seidenfaden' (treated as 'Rare') and (4) in the present report from Checko (Buxa Wildlife Sanctuary), Jalpaiguri district of West Bengal. P. Bruhl (*l.c.*) and N. Pearce & P.J. Cribb (*l.c.*) cite its presence in the Sikkim and Darjeeling hills based on the type collection in Mungpoo, whereas Srivastava (1996) doubtfully reports its occurrence in Sikkim [as 'Sikkim (?)' and without citing any locality]. Later S.Z. Lucksom (*l.c.*) specified its occurrence in West Sikkim (Sakyong, Linchom). The specimens cited by R. Das & K. Gogoi (*l.c.*) are not found in ASSAM (probably not deposited) and therefore not available for study. But it is evident from the coloured dissection-plate and photographs provided by R. Das & K. Gogoi (*l.c.*) that their species is not *Z. grandis* but *Z. reflexa*. Several attempts to rediscover *Zeuxine reflexa* in its type-locality (Mungpoo and its surroundings; located at the fringe of Mahananda Wildlife Sanctuary) by the second author (AB) remained unsuccessful during the revisionary studies of subtribe Goodyerinae in India. Even the comprehensive flora of the Mahananda Wildlife Sanctuary, recently prepared (Paul 2013, *ined.*), does not mention the presence of *Zeuxine reflexa*. Increasing population size inevitably paired with settlement pressure and the conversion of hill-slopes to agricultural areas as well as the 'Jhum cultivation' (a type of shifting cultivation in India) are responsible for the increasing rarity and elimination of the *Zeuxine reflexa* populations. In India the species is reported only from 6 locations (Fig. 3). The estimated 'Extent of Occurrence' (EOO; criterion B1) of *Zeuxine reflexa* in India is $\pm 6968 \text{ km}^2$. The EOO is measured by plotting the known collection localities in a base-map of ArcGIS and then calculating the area (excluding the area belonging to Bhutan) within a hypothetical boundary created by joining the localities with help of the software. The 'Area of Occupancy' (AOO; criterion B2) is derived and placed at $< 10 \text{ km}^2$ (severely fragmented and with a projected decline of mature individuals, being



Fig.3. Map showing occurrence and 'EOO' of *Zeuxine reflexa* King & Pantling in India
 (the area belonging to India is marked with red lines; Map created with ArcGIS).

sparsely distributed; Critically Endangered). The AOO is measured against the grid size of 1 km² for each of the 6 locations in India as the species occupies very small area (< 100 m²) in every recorded cluster with very short period of flowering and fruiting. The number of mature individuals (criterion D) is estimated to be less than 250 in all subpopulations/clusters. The phrase 'severely fragmented' can be applied to this taxon as most of its individuals are found in small and relatively isolated clusters/subpopulations with increased extinction risks. As per guidelines (IUCN, 2012) - 'only the criterion for the highest category of threat that the taxon qualifies for should be listed' and therefore, the threat perception on the species is assessed as a Critically Endangered [CR B2ab (ii, iv)] in Indian perspective.

Beside the above mentioned six locations (Fig. 3), *Zeuxine reflexa* is not reported in other parts of India as authors thoroughly perused literature focused on Indian orchids (Gammie, 1911; Duthie, 1906; Hara, 1966; Mathew, 1966; Santapau & Kapadia, 1966; Mukherjee, 1972; Sikdar & Rao, 1975; Hore & Balakrishnan, 1984; Jain & Mehrotra, 1984; Deva & Naithani, 1986; Ghatak & Devi, 1986; Katakai, 1986; Das, 1987; Joseph, 1987; Pradhan, 1976; Singh *et al.*, 1990; Banerjee, 1993; Sathishkumar & Manilal, 1994; Chowdhery, 1998; Bist & Katham, 1999; Bose *et al.*, 1999; Hynniewta *et al.*, 2000; Barua, 2001; Chowdhery, 2001; Chauhan, 2001; Deb *et al.*, 2003; Sathishkumar & Manilal, 2004; Sathishkumar & Sureshkumar, 2005; Misra 2007; Rao, 2007; Jalal *et al.*, 2008; Chowdhery, 2009). It can be concluded with reasonable certainty that in India the species is presently restricted to Assam, Sikkim and West Bengal.

Threat Status in India: Critically Endangered [CR B2ab (ii, iv)].

Specimens Examined: INDIA. West Bengal: Darjeeling dist., Mungpoo, c. 1067 m, April 1895, *Pantling* 361 (CAL; BM, photo!; K, photo!); Jalpaiguri dist., Buxa Wildlife Sanctuary, Checko, c. 78 m, 9 February 2013, *Anant Kumar* 58801 A–D (CAL).

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Le genre *Zeuxine* Lindley est représenté par 80 espèces environ, distribuées depuis l'Afrique tropicale jusqu'en Asie Centrale et le Pacifique ouest. Dix sept

espèces ont été énumérées pour l'Inde en 2010 et une nouvelle espèce a été ajoutée un peu plus tard. Au cours de l'exploration botanique du Sanctuaire Buxa, le premier auteur a découvert une population unique de *Zeuxine* comprenant douze individus adultes, identifiés comme *Z. reflexa* King & Pantling. La description originale était basée sur une collecte effectuée en avril 1895 à Mungpoo, district de Darjeeling, West Bengal. L'espèce est étroitement apparentée à *Z. affinis* (Lindley) Bentham ex Hooker f. mais en diffère principalement par ses appendices beaucoup plus épais sur l'hypochile, ses lobules d'épichile un peu plus longs et réfléchis, et ses processus oblongs distinctifs sur la colonne. L'article propose une description détaillée de l'espèce, accompagnée d'une planche botanique et de photographies, ainsi qu'une première évaluation de son état de menace en Inde conformément aux critères de l'UICN.

Habitat. L'espèce pousse dans une litière de feuilles, dans des endroits ombragés en forêts, à des altitudes comprises entre 75 et 1 400 m. Bien que les habitats soient les mêmes pour d'autres espèces de *Zeuxine*, *Z. reflexa* a été beaucoup moins collecté.

Statut de conservation. Hors l'Inde, *Z. reflexa* est connu au Bhoutan, en Chine, à Taïwan et en Thaïlande. Mais son état de conservation n'est pas discuté dans les flores correspondantes. En Inde l'espèce a été enregistrée quatre fois. L'accroissement de la population humaine, qui va inévitablement de pair avec la pression des constructions et la conversion des pentes des collines en zones agricoles, entraîne la destruction progressive des populations de l'espèce. La discussion de ces données permet aux auteurs d'évaluer plusieurs critères de l'UICN et de proposer un statut final « En danger critique » [CR B2ab (ii, iv)].

1 : Central National Herbarium, Botanical Survey of India, A.J.C.B. Indian Botanic Garden, Howrah – 711 103. Email: anant_bsi@yahoo.com

2 : Central National Herbarium, Botanical Survey of India, A.J.C.B. Indian Botanic Garden, Howrah – 711 103. Email: avibsi@rediffmail.com

* auteur correspondant

3 : Botanical Survey of India, Deccan Regional Centre, Inner Ring Road, Hyderabad – 500 048. Email: pvenu.bsi@gmail.com

4 : Andhra University, Department of Botany, College of Science and Technology, Andhra University, Andhra Pradesh, Visakhapatnam – 530 003.

Email: raovyechuri@yahoo.co.in